

A parasitic interaction in RHIC at 24 GeV

T. Sen

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In this experiment at RHIC, 1 proton bunch will be injected in each ring. At one parasitic interaction, the separation will be varied over some range while at the diametrically opposite parasitic the beam separation will be kept at a large value (10σ). The aim is to observe the beam losses, emittance changes as the separation at the 1st parasitic is varied. The beams are separated vertically around IP6, so only vertical separations are changed. In this note the optics changes are calculated using both analytical estimates (Sen et al PRSTAB 2004) and using MAD. Specifically the changes in zero amplitude tunes, beta functions and orbits are calculated.

Energy [GeV]	24.3
Bunch intensity [$\times 10^{11}$]	2
Emittance, 95% normalized [π mm-mrad]	15
Energy spread	2.8×10^{-3}
Bunch length [m]	1.35
Beam-beam parameter	-9.8×10^{-3}

Table 1: Beam parameters

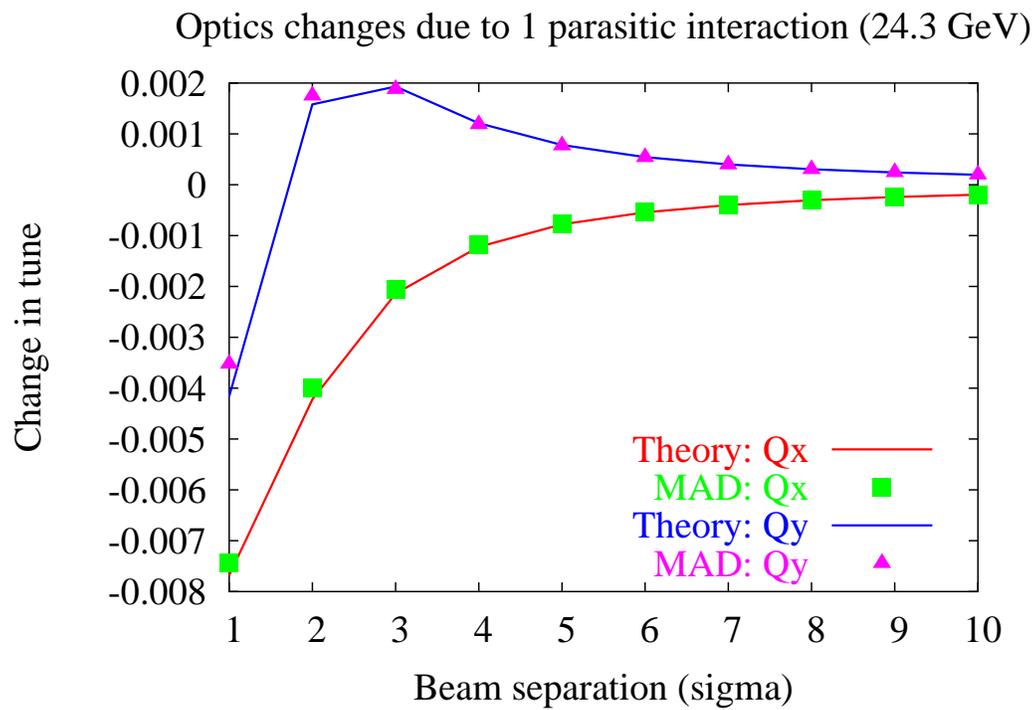


Figure 1: Change in tunes vs separation (σ).

Optics changes due to 1 parasitic interaction (24.3 GeV)

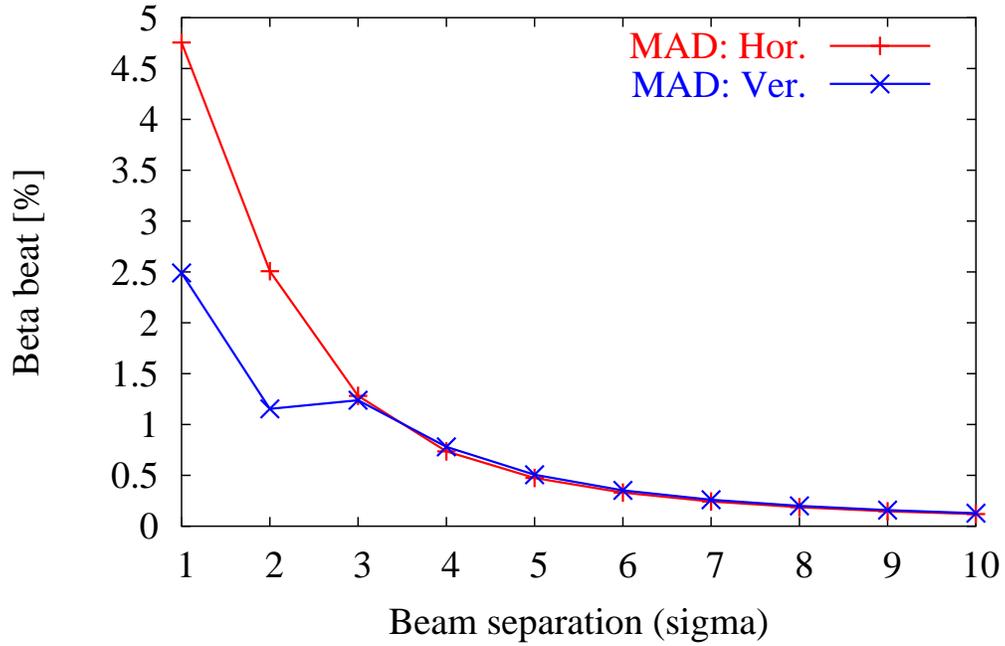


Figure 2: Beta beat vs separation (σ).

Optics changes due to 1 parasitic interaction (24.3 GeV)

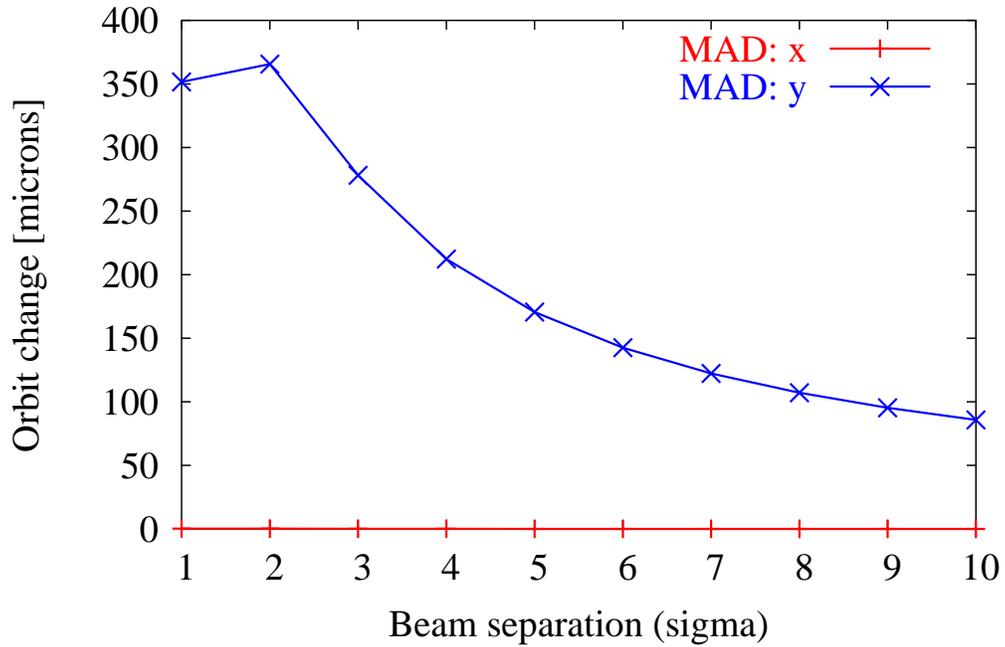


Figure 3: Change in orbit vs separation (σ).